

Order from chaos and possibly a very highly polarized spin injector

Despite experimental proof of intermixing, alloying, floating surface layers and the seeming triumph of entropy, the iron (Fe) overlayers grown on gallium arsenide (GaAs) exhibit very strong spin polarization, with the signature of emission from a very highly ordered single crystal. Why is this important? The technological possibilities of spintronic or magneto-electronic devices, particularly when coupled with potentially pure spin sources such as half-metallic ferromagnets, continue to engender great interest. One possibility for a room-temperature spin injector is iron on gallium arsenide. Recently, a surprising and potentially important result was reported: the manifestation of order coming out of chemical chaos. The generation of such highly polarized emission from iron layers, grown directly on gallium arsenide may open the door to significant technological applications. This work was published recently in "Surface Science" by Tobin et al. (Vol 604, page 1342, 2010). Because of the importance of this paper, the editor arranged for colleague to submit an Invited Perspective, to introduce the article. [G. J. Mankey, Surface Science 604, 1333 (2010)]

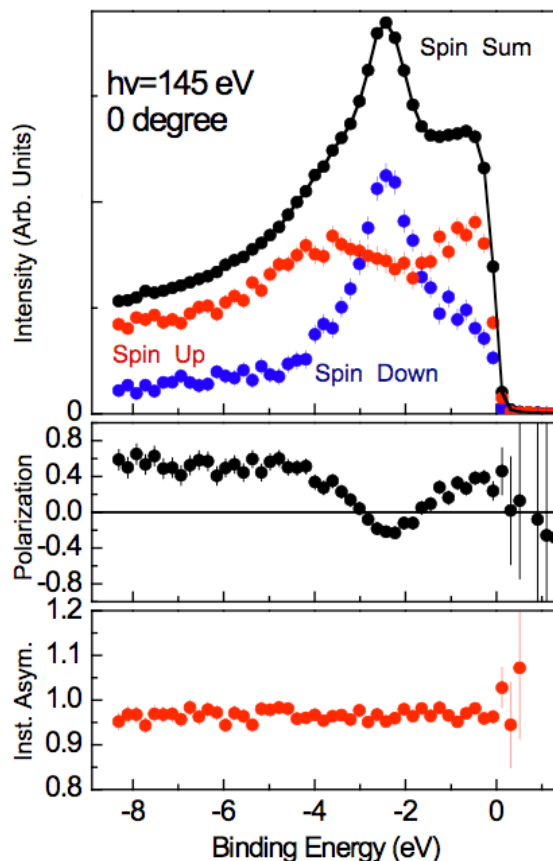


Figure 1
Spin resolved photoelectron spectroscopy results for the valence bands of 20 angstroms of iron, deposited upon gallium arsenide. Top panel: spin resolved spectra. Middle panel: polarization. Lower panel: instrumental asymmetry.